

Name _____

Date _____

Hyperbola Practice Worksheet

Graph the hyperbolas. Find the center, foci, and vertices. For #s 7 & 10, find the equation of the asymptotes.

1. $\frac{x^2}{9} - \frac{y^2}{25} = 1$

2. $\frac{y^2}{4} - \frac{x^2}{25} = 1$

3. $4x^2 - y^2 = 4$

4. $4y^2 - 25x^2 = 100$

5. $\frac{(y-3)^2}{25} - \frac{(x+2)^2}{9} = 1$

6. $\frac{(x+1)^2}{4} - \frac{(y+2)^2}{16} = 1$

7. $16x^2 - 4y^2 - 96x + 8y + 76 = 0$

8. $y^2 - x^2 - 2x - 4y - 13 = 0$

9. $y^2 - 4x^2 - 2y + 40x - 163 = 0$

10. $9x^2 - 16y^2 - 90x + 32y + 65 = 0$

$$1. \begin{aligned} a &= 3 \\ b &= 5 \\ c &= \sqrt{34} \end{aligned}$$

$$\begin{aligned} 9 + 25 &= c^2 \\ 34 &= c^2 \end{aligned}$$

$$\begin{aligned} C(9,0) \quad & V(3,6) \\ & V(-3,0) \\ & F(\sqrt{34}, 0) \\ & F(-\sqrt{34}, 0) \end{aligned}$$

$$2. \begin{aligned} a &= 2 \\ b &= 5 \\ c &= \sqrt{29} \end{aligned}$$

$$\begin{aligned} 4 + 25 &= c^2 \\ 29 &= c^2 \end{aligned}$$

$$\begin{aligned} C(9,0) \quad & V(0, \pm 2) \\ & F(0, \pm \sqrt{29}) \end{aligned}$$

$$3. \frac{x^2}{1} - \frac{y^2}{4} = 1$$

$$a=1 \quad b=2 \quad c=\sqrt{5}$$

$$\begin{aligned} C(9,0) \quad & \cancel{V(0, \pm 2)} \quad V(\pm 1, 0) \\ & F(\pm \sqrt{5}, 0) \end{aligned}$$

$$4. \frac{y^2}{25} - \frac{x^2}{4} = 1$$

$$a=5 \quad b=2 \quad c=\sqrt{29}$$

$$\begin{aligned} 25 + 4 &= c^2 \\ 29 &= c^2 \end{aligned}$$

$$\begin{aligned} C(0,0) \quad & V(0, \pm 5) \\ & F(0, \pm \sqrt{29}) \end{aligned}$$

$$5. \cancel{a=2} \quad \cancel{b=4} \quad \cancel{c=2\sqrt{5}}$$

WRONG ONE

$$\cancel{4+16=c^2}$$

$$\cancel{20=c^2}$$

$$\begin{aligned} & \cancel{C(-2,3)} \\ & \cancel{V(-2,8)} \quad \cancel{V(-2,-2)} \\ & \cancel{F(-2, 3+2\sqrt{5})} \\ & \cancel{F(-2, 3-2\sqrt{5})} \end{aligned}$$

$$5. \cancel{a=2} \quad a=5$$

$$b=\cancel{4} \quad 3$$

$$c = \sqrt{34}$$

$$C(-2,3)$$

$$V(-2,8) \quad V(-2,-2)$$

$$F(-2, 3+\sqrt{34}) \quad F(-2, 3-\sqrt{34})$$

$$25 + 9 = c^2$$

$$34 = c^2$$

$$\begin{array}{ll}
 6. \quad a=2 & C(-1, -2) \\
 b=4 & V(+1, -2) \quad V(-3, -2) \\
 c=2\sqrt{5} & F(-1+2\sqrt{5}, -2) \quad F(-1-2\sqrt{5}, -2)
 \end{array}$$

$$4+16=c^2$$

$$2\sqrt{5}=\sqrt{20}=c$$

$$\begin{array}{l}
 7. \quad 16x^2 - 96x - 4y^2 + 8y = -76 \\
 16(x^2 - 6x + 9) - 4(y^2 - 2y + 1) = -76 + 144 - 4 \\
 16(x-3)^2 - 4(y-1)^2 = 64
 \end{array}$$

$$\frac{(x-3)^2}{4} - \frac{(y-1)^2}{16} = 1$$

$$C(3, 1)$$

$$V(5, 1) \quad (1, 1)$$

$$a=2$$

$$F(3+2\sqrt{5}, 1) \quad F(3-2\sqrt{5}, 1)$$

$$b=4$$

$$c=2\sqrt{5} \quad 4+16=c^2$$

Asymptotes

$$y=2x+b$$

$$y=-2x+b$$

$$1=2(3)+b$$

$$1=-6+b$$

$$-5=b$$

$$7=b$$

$$y=2x-5$$

$$y=-2x+7$$

$$8. y^2 - 4y - x^2 - 2x = 13$$

$$y^2 - 4y + 4 - (x^2 + 2x + 1) = 13 + 4 - 1$$

$$(y-2)^2 - (x+1)^2 = 16$$

$$\frac{(y-2)^2}{16} - \frac{(x+1)^2}{16} = 1$$

$$C(-1, 2)$$

$$V(-1, 6) \quad V(-1, -2)$$

$$F(-1, 2+4\sqrt{2}) \quad F(-1, 2-4\sqrt{2})$$

$$a=4 \quad b=4 \quad c=4\sqrt{2}$$

$$16+16=c^2 \nearrow$$

$$9. y^2 - 2y - 4x^2 + 40x = 163$$

$$y^2 - 2y + 1 - 4(x^2 - 10x + 25) = 163 + 1 - 100$$

$$(y-1)^2 - 4(x-5)^2 = 64$$

$$\frac{(y-1)^2}{64} - \frac{(x-5)^2}{16} = 1$$

$$C(5, 1)$$

$$V(5, 9) \quad V(5, -7)$$

$$F(5, 1+4\sqrt{5}) \quad F(5, 1-4\sqrt{5})$$

$$a=8 \quad b=4 \quad c=4\sqrt{5}$$

$$64+16=c^2$$

$$10. 9x^2 - 90x - 16y^2 + 32y = -65$$

$$9(x^2 - 10x + 25) - 16(y^2 - 2y + 1) = -65 + 225 - 16$$

$$9(x-5)^2 - 16(y-1)^2 = 144$$

$$\frac{(x-5)^2}{16} - \frac{(y-1)^2}{9} = 1$$

$$C(5, 1)$$

$$V(9, 1) \quad V(1, 1)$$

$$F(10, 1) \quad F(0, 1)$$

$$a=4 \quad b=3 \quad c=5 \quad 16+9=c^2$$

Asymptotes

$$y = \frac{3}{4}x + b$$

$$1 = \frac{3}{4}(5) + b$$

$$-\frac{11}{4} = b$$

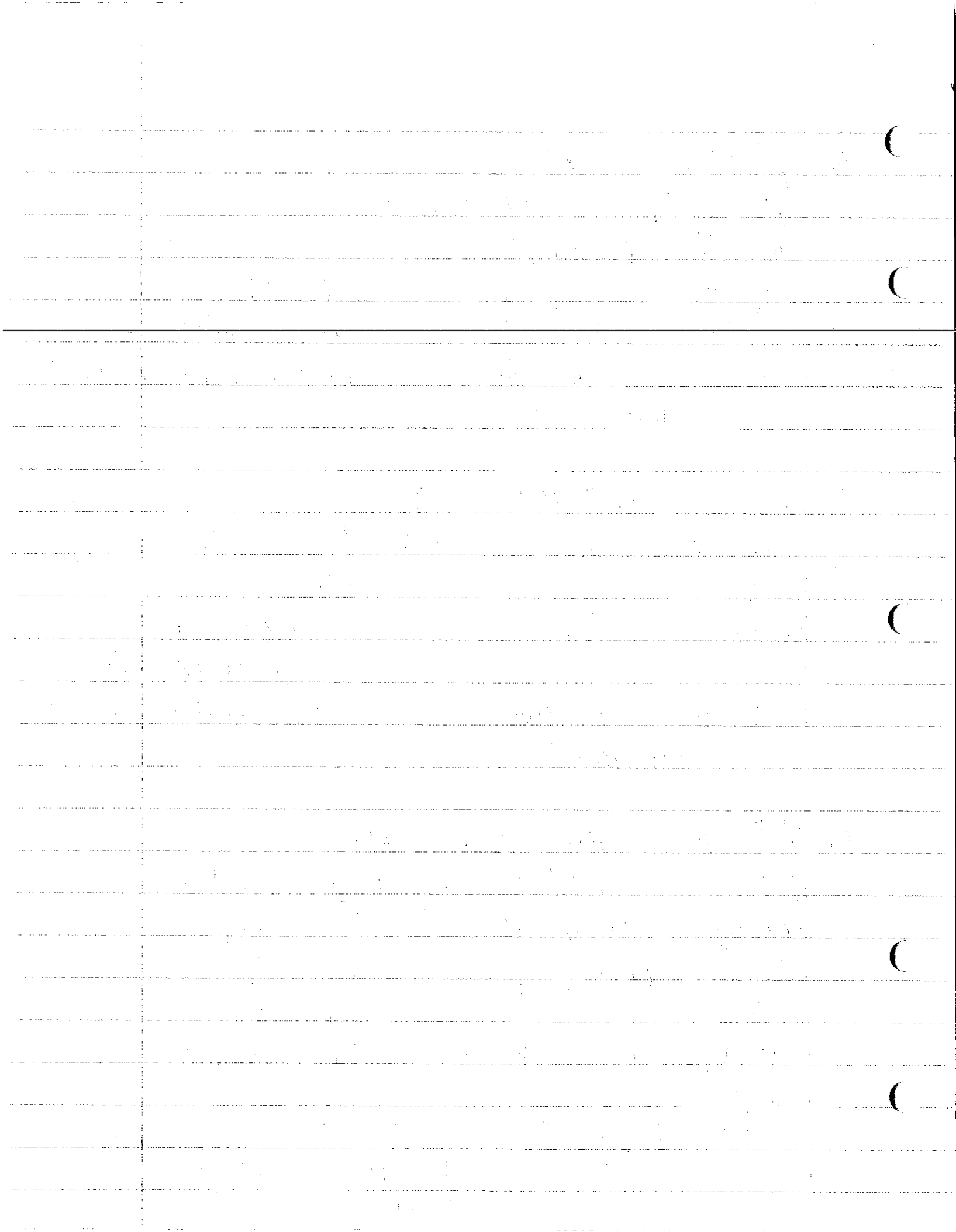
$$y = \frac{3}{4}x - \frac{11}{4}$$

$$y = -\frac{3}{4}x + b$$

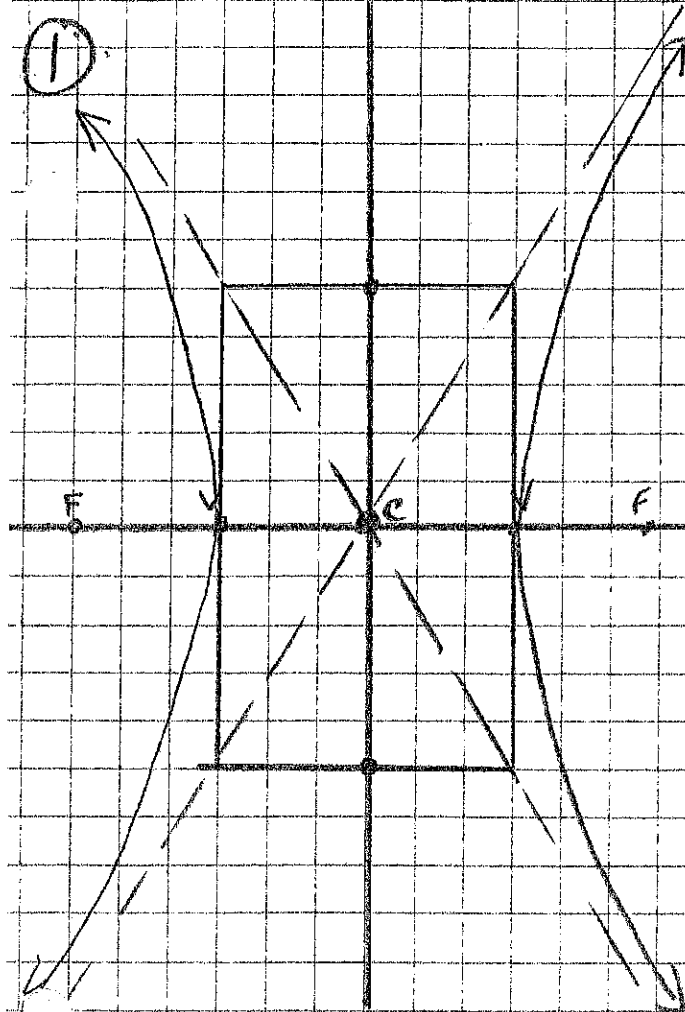
$$1 = -\frac{3}{4}(5) + b$$

$$\frac{17}{4} = b$$

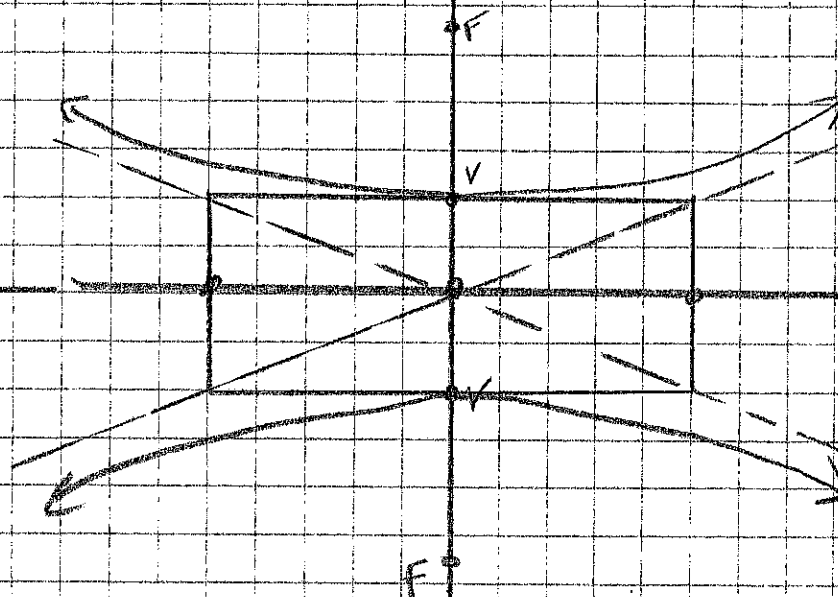
$$y = -\frac{3}{4}x + \frac{17}{4}$$



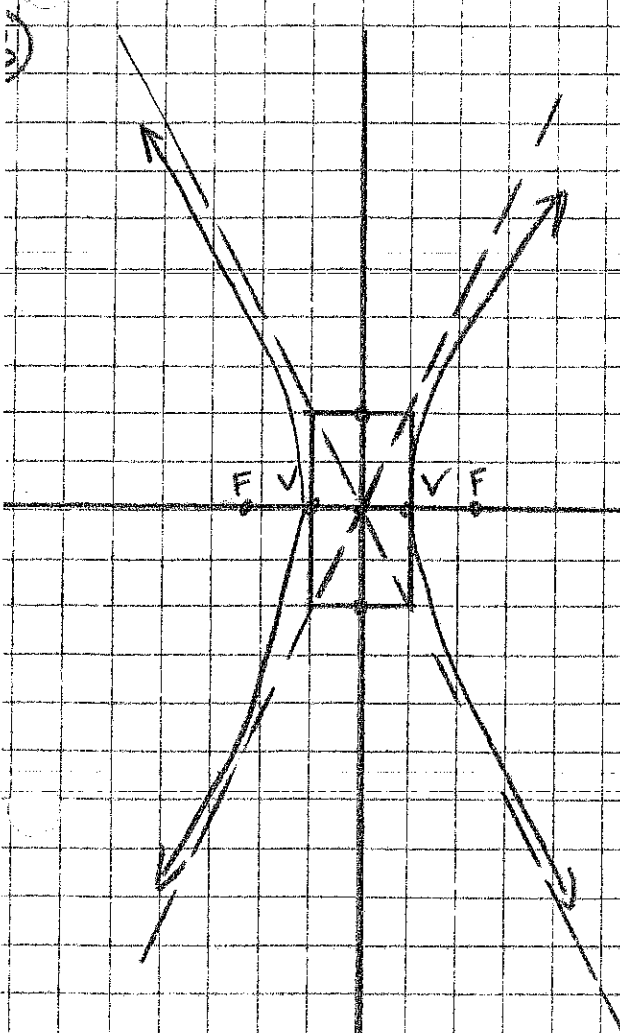
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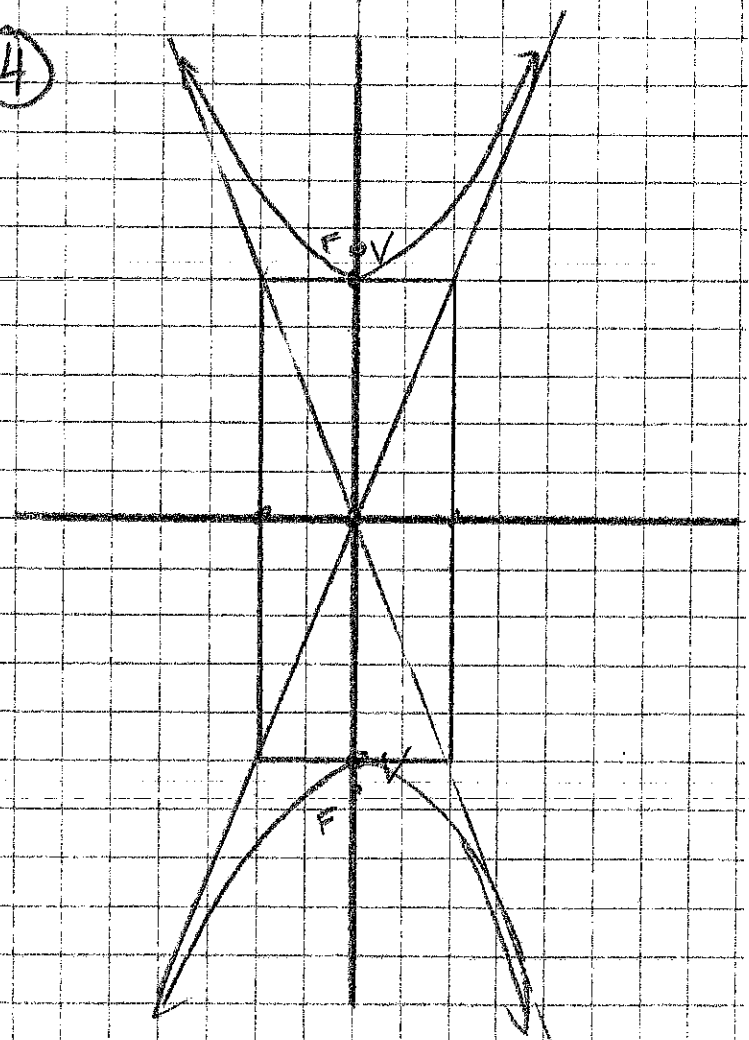
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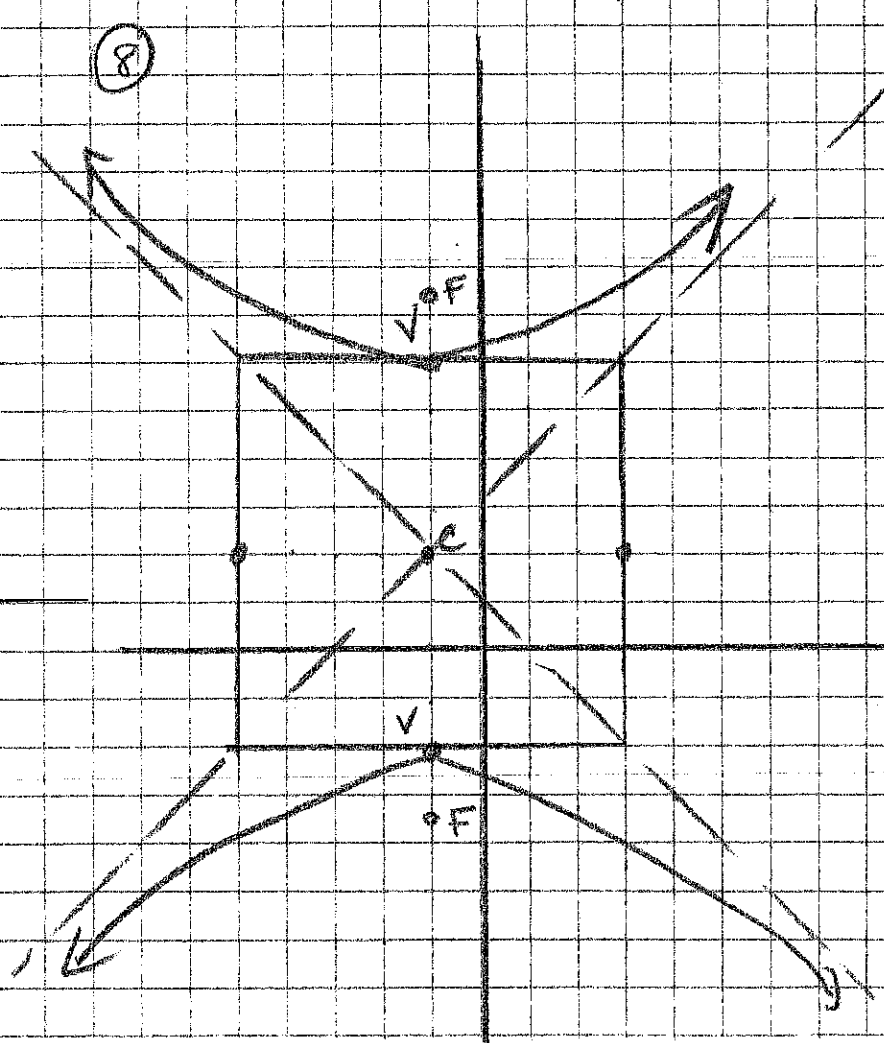
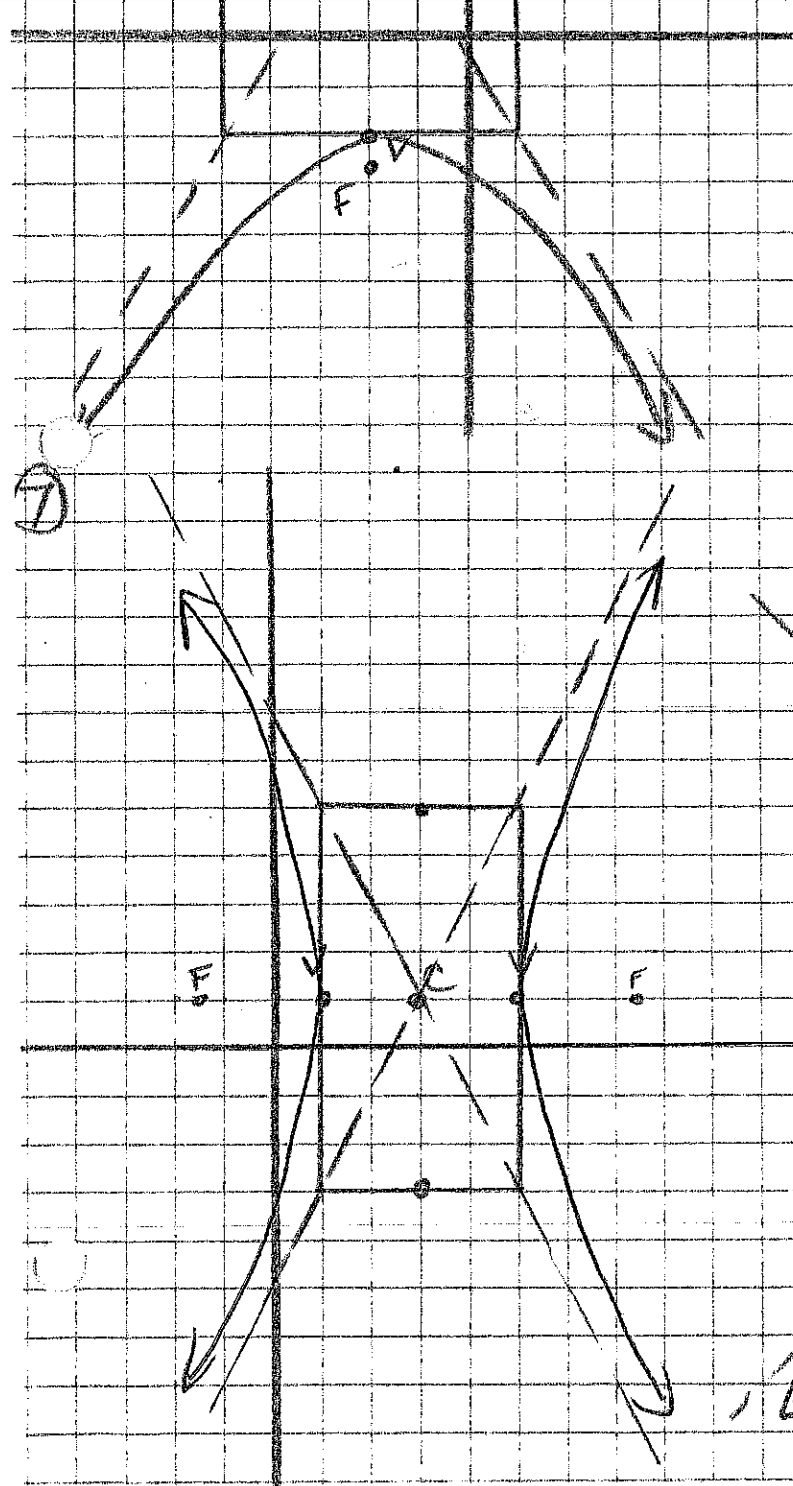
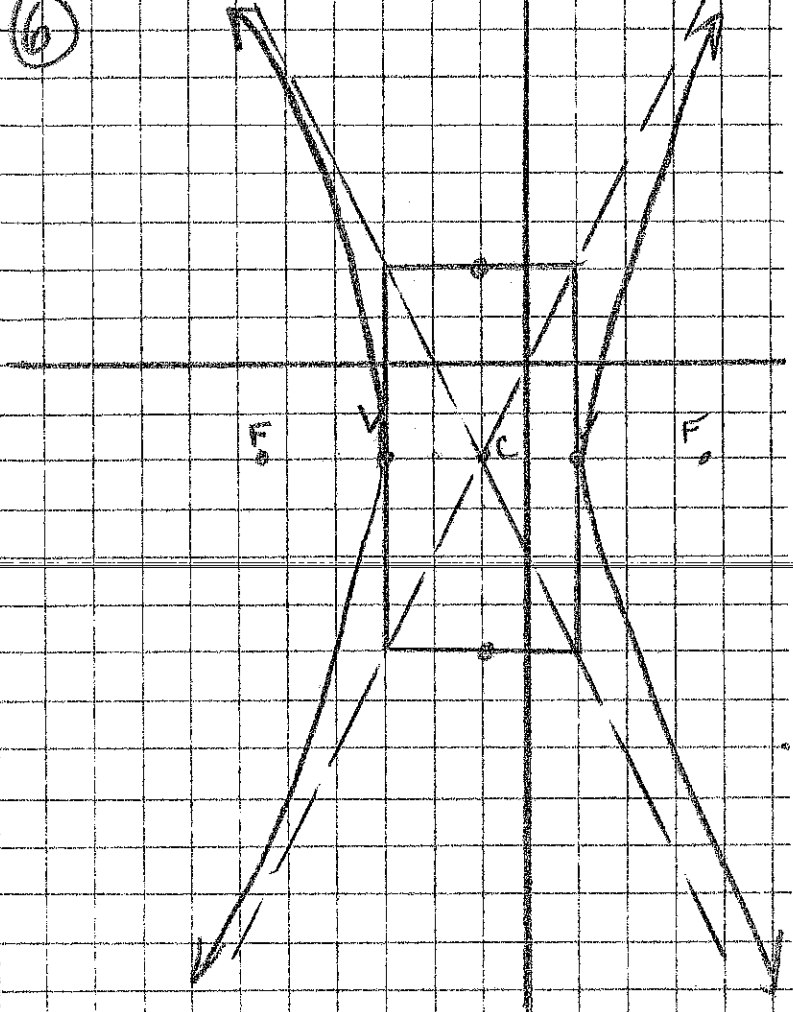
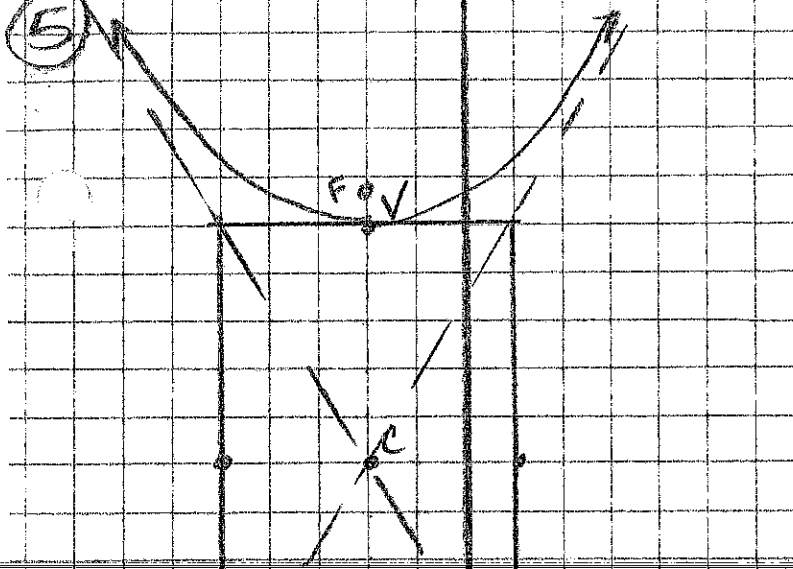


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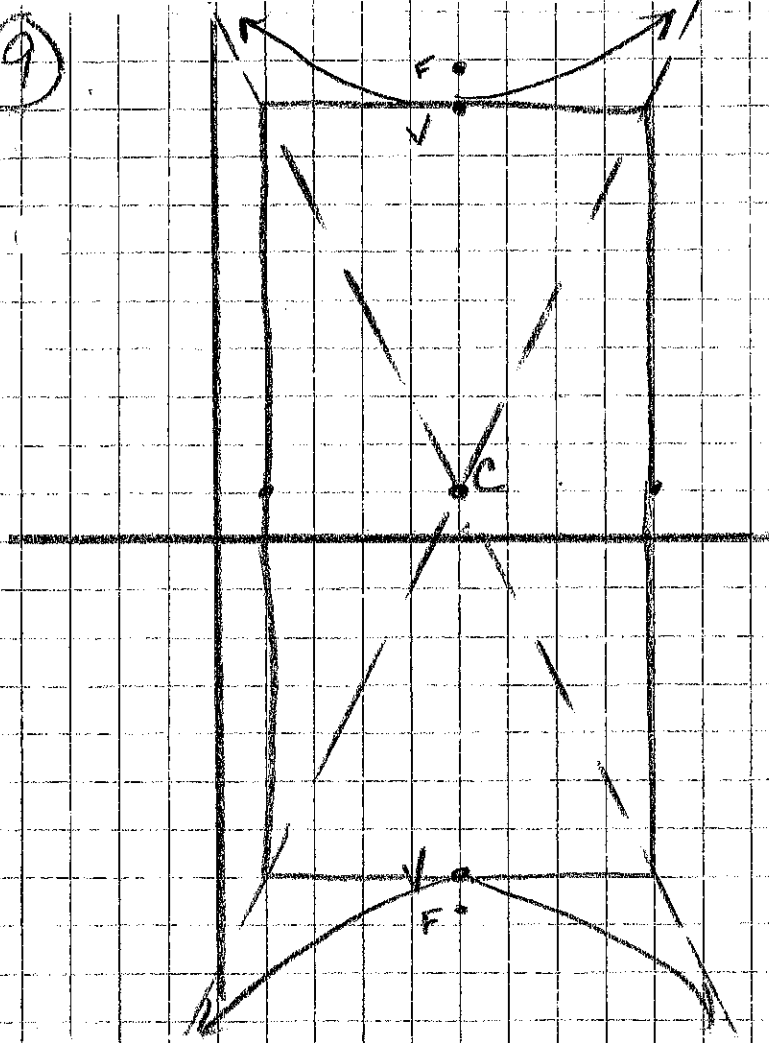


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9.



10.

